Radiological Physics Center
The University of Texas M. D. Anderson Cancer Center
1515 Holcombe Boulevard, Unit 547
Houston, Texas 77030

REPORT TO THE AAPM THERAPY PHYSICS COMMITTEE

Report No. 128 July 1, 2007 – October 31, 2007

a) Specific Aims

The specific aims of this project have not changed during this reporting period. The primary aim is to assure NCI and the cooperative groups that the participating institutions have adequate staff, equipment, and quality assurance procedures, so that all participants can be expected to deliver radiation treatments that are clinically comparable to other institutions in the cooperative groups. To accomplish this, the RPC monitors external beam and brachytherapy calibrations, evaluates the accuracy of dose calculation algorithms, and determines the adequacy of quality assurance procedures at the participating institutions. Methods include on-site dosimetry reviews, remote monitoring by mailed TLD and anthropomorphic phantoms, and evaluation of benchmark and human patient treatment plans.

b) Studies and Results

The RPC presently monitors 1,532 megavoltage therapy sites in North America, Europe, and elsewhere in the world, that participate in cooperative group clinical trials funded by the NCI. This is an increase of about 60 institutions in the last year. The cooperative groups monitored include ACOSOG, ACRIN, CALGB, COG, ECOG, GOG, NABTT, NCCTG, NSABP, RTOG and SWOG. We also communicate regularly with the Cancer Trials Support Unit (CTSU) to assure that institutions participating through their programs are properly monitored.

- **On-Site Dosimetry Reviews:** In the year since October 1, 2006, RPC physicists have performed on-site dosimetry evaluations at 31 institutions, evaluating 180 beams (a "beam" is a single photon beam or a cadre of electron beams). Twenty-eight (90%) of the institutions received at least one recommendation for actions that should improve their quality assurance programs. During the last year, development was begun of procedures for dosimetry review visits to proton facilities.
- **TLD:** Between October 1, 2006 and September 30 2007, 10,539 (distinct energies) beams were measured with TLD at the monitored institutions. Overall, 1.5% of the irradiated TLD received doses that disagreed with the institution's stated dose by more than 5%. Institutions continuing to use the obsolete calibration protocol (TG-21) exhibited a higher discrepancy rate than the institutions that had converted to the new calibration protocol (TG-51). The number of institutions still using TG-21 has decreased slightly to 11% as of October 1, 2007. In 2003, the RPC began sending TLD to institutions on an annual schedule, rather than waiting six months from receipt of the previous shipment. This has been a successful change in that it allows us to manage our TLD mailings better throughout the year. In addition, this change, along with more aggressive pursuit of delinquent institutions, has reduced the TLD return time from about 40-50 days at the beginning of 2003-2004, to about 20 days today. Increased efficiencies resulting from electronic data collection and review have reduced the time from TLD irradiation to delivery of reports to about 21 days (from 35 days in 2001). TLDs were irradiated in >30 proton beams of different energies SOBPs, and field sizes, to evaluate the response and suitability of the RPC TLD system, and preparations were made to begin routine monitoring of proton facilities. An optically-stimulated luminescence (OSL) system was evaluated for its ability to replace TLD with equivalent accuracy and lower cost.
- **Patient Treatment Review:** In the year since October 1, 2005, individual protocol patient treatment records were evaluated for 396 patients treated on GOG, NSABP, NCCTG, and RTOG protocols. Of these, 47 patients received brachytherapy treatments.
- **Credentialing Processes:** The RPC participates in the credentialing of institutions for protocols involving advanced technologies including brachytherapy, IMRT, stereotactic radiosurgery (SRS) and stereotactic body radiation therapy (SBRT). This activity is partially supported by a subcontract from the Advanced Technologies for Clinical Trials grant. For IMRT and SRS, credentialing includes irradiation of an anthropomorphic phantom provided by the RPC that contains anatomic structures and dosimeters. To date, the RPC has issued 405 reports to institutions that irradiated the RPC head and neck IMRT phantom. Of these, 310 indicated that the irradiation complied with the institution's treatment

plan within criteria agreed to by the RPC and the RTOG. The first-time pass rate continues to be 69%. The RPC's lung phantom has been used to credential institutions to participate in stereotactic lung trials. Twenty-five reports have been issued. Of them, 18 indicated that the irradiation complied with the institution's treatment plan within criteria agreed to by the RPC and RTOG. Valuable data regarding heterogeneity corrections has been obtained and is being prepared for publication. Through a subcontract issued to Washington University, software was developed to enable phantom measurements to be compared with treatment plans using a 2D gamma-index calculation. The RPC plays the lead role in credentialing institutions for a partial breast irradiation (PBI) trial run jointly by NSABP and RTOG. Credentialing requires completion of facility and knowledge-assessment questionnaires (using web-based forms) and electronic submission of a benchmark treatment plan. To date, 2015 applications for credentialing have been received (all or part) and 1648 credentials have been issued (3D CRT arm-917; Mammosite arm-604; multicatheter arm-127). The remainder are awaiting submission of required information or replies to questions. Complete applications are processed within 2 business days. The RPC participated in the development of NCI guidelines for the use of protons in clinical trials, and in an RTOG guideline for the use of IGRT.

- **Low-Energy Brachytherapy Sources:** Dr. Ibbott represents the RPC on a subcommittee appointed by the AAPM to address the use of new sources. The RPC acts as a clearinghouse of information and makes available on a web site a list of sources meeting the AAPM dosimetric prerequisites. Discussions have been held with the ESTRO physics committee regarding linking brachytherapy information complied by the two groups.
- **Planning Workstation:** An educational grant from Varian Corporation enabled the RPC to acquire an Eclipse treatment planning workstation. The TPS is now being used to re-calculate institutions' brachytherapy treatment plans for verification. Progress is being made to implement external beam calculation reviews.
- **Database:** The RPC database continues to greatly facilitate our work. Results of remote measurements, on-site dosimetry reviews, and treatment record reviews are available to RPC staff immediately. Through an agreement with the Health Services Research group at Memorial Sloan-Kettering, the RPC acquired demographic information about the remaining radiotherapy centers in the US and these data are being entered into our database.
- **Webpage:** The RPC webpage continues to be maintained and updated regularly. We have implemented online web forms for a number of credentialing activities, including RTOG 0413/NSABP B-39.
- **Community Relations:** The RPC participated in the development and conduct of a workshop on radiation therapy QA held in February 2007. The RPC played a lead role in organizing and conducting this workshop. The proceedings have been accepted for publication in IJROBP.
- **AAPM Oversight:** The AAPM Therapy Physics Committee continues to be our scientific advisory committee. We report to this committee three times per year, and participate in subcommittees, task group, and working groups. A task group of the TPC performs a one-day in depth evaluation annually.
- **Clinical Advisory Committee:** A group of 5 radiation oncologists was formed as a clinical advisory committee. The Committee is contacted when questions arise regarding RPC clinical operations.

c) Significance

Radiation therapy continues to move towards highly conformal therapies using high technology modalities. As clinical trials incorporate these technologies, the RPC is developing tools to monitor the quality of these therapies. At the same time, we continue our traditional role, monitoring conventional therapies, which still represent the bulk of treatments in clinical trial studies. The TLD monitoring program and on-site dosimetry reviews have played a key role in achieving consistent dosimetry over the years. Evidence of our contributions to improved dosimetry at participating institutions is demonstrated by the recommendations made by the RPC following a visit.

d) Plans

Plans for this budget period are not significantly changed from those outlined in the application for the current grant cycle.

- **On-Site Dosimetry Reviews:** FTE physicists will review 50 beams. Visits will be made to proton facilities.
- **Mailed TLD Program:** Our criteria for acceptability have not changed. An alternative to TLD (OSL) will undergo extensive evaluation during the next year. Routine monitoring of proton facilities will begin.

- **Credentialing:** We will continue to work with the groups to focus our efforts appropriately.
- **Patient Treatment Review:** Except for some studies evaluated by the RTOG QA office, the RPC is the only QA office that focuses on technical evaluation of radiation dose (dosimetry review). The RPC will continue to review some fraction of patients to assess the quality of the data currently being submitted. The Eclipse workstation will be incorporated into our recalculation of external beam dose distributions.
- **Anthropomorphic Phantoms:** Again this year, additional phantoms were constructed to meet the demand for credentialing on all existing protocols and new developing protocols. Special attention continues to be given to the evaluation of heterogeneity corrections in lung protocols.
- **Liaison with Cooperative Groups, AAPM, etc.:** The AAPM Therapy Physics Committee continues as our scientific advisory body.
- **Data Transfer:** The RPC, through the ATC subcontract, continues to develop and implement electronic data exchange capabilities. We now use electronic data routinely in the evaluation of phantom irradiations.

- **Webpage:** We continue to add capabilities to the RPC webpage.

PARTICIPANT FEE:

Institutions invoiced FY07	1496
No XRT/Canceled/Inactive	10
Invoiced by RDS	0
Institutions paid	973

PUBLICATIONS AND ABSTRACTS
Publications Accepted/Published (2005-present):

1. Cho S, Vassiliev O, Lee S, Liu H, Ibbott G, Mohan R. Reference photon dosimetry data and reference phase space data for the 6 MV photon beam from Varian Clinac 2100 series linear accelerators. Med. Phys. 32:137-48, 2005.

2. Molineu A, Followill DS, Balter PA, Hanson WF, Gillin MT, Huq MS, Eisbruch A, Ibbott GS. Design and Implementation of an Anthropomorphic Quality Assurance Phantom for Intensity Modulated Radiation Therapy for the Radiation Oncology Group. *Int. J. of Radiat. Oncol. Biol. Phys.* 63:577-83, 2005.

3. Williamson J, Butler W, DeWerd L., Huq M, Ibbott G, Li, Z, Mitch M, Nath R, Rivard M, Todor D. Recommendations of the American Association of Physicists in Medicine regarding the Impact of Implementing the 2004 Task Group 43 report on Dose Specification for 103Pd and 125I Interstitial Brachytherapy. Med. Phys. 32:1424-39, 2005.

4. Zhang G, Guerrero T, Segars W, Huang T, Bilton S, Lin KP, Ibbott G, Dong L, Forster K. Elastic Image Mapping for 4D Dose Estimation in Thoracic Radiotherapy. Radiation Protection Dosimetry 115:497-502, 2005.

5. Gifford KA, Horton Jr. JL, Jackson EF, Steger III TR, Heard MP, Mourtada F, Lawyer AA, Ibbott GS. Comparison of Monte Carlo calculations around a Fletcher Suit Delclos ovoid with radiochromic film and normoxic polymer gel dosimetry. *Medical Physics* 32:2288-94, 2005.

6. Cho SH. Estimation of tumor dose enhancement due to gold nanoparticles during typical radiation treatments: A preliminary Monte Carlo study. *Physics in Medicine and Biology* 50:163-73, 2005.

7. Kry SF, Salehpour M, Followill DS, Stovall M, Kuban DA, White RA, Rosen II. Out-of-Field Photon and Neutron Dose Equivalents from Step-and-Shoot Intensity-Modulated Radiation Therapy. Int J Radiat Oncol Biol Phys 62:1204-16, 2005.

8. Kry SF, Salehpour M, Followill DS, Stovall M, Kuban DA, White RA, Rosen II. The Calculated Risk of Fatal Secondary Malignancies from Intensity-Modulated Radiation Therapy. Int J Radiat Oncol Biol Phys 62:1195-1203, 2005.

9. Halvorsen H, Das IJ, Fraser M, Freedman DJ, Rice III RE, Ibbott GS, Parsai EI, Robin Jr. TT, Thomadsen BR. AAPM Task Group 103 Report on Peer Review in Clinical Radiation Oncology Physics. *Journal of Applied Clinical Medical Physics* 6:50-64, 2005.

10. Tailor RC, Hanson WF, Wells N, Ibbott GS. Consistency of absorbed dose to water measurements using 21 ion-chamber models following the AAPM TG51 and TG21 calibration protocols. Med Phys 33:1818-28, 2006.

11. Randall M, Ibbott GS. Intensity-modulated radiation therapy for gynecologic cancers: pitfalls, hazards, and cautions to be considered. Seminars in Radiat Oncol 16:138-43, 2006.

12. Briere TM, Tailor R, Tolani N, Prado K, Lane R, Woo S, Ha C, Gillin MT, Beddar S. Patient dosimetry for total body irradiation using single-use MOSFET detectors. Submitted to Medical Physics, 2006.

13. Minniti R, Chen-Mayer H, Seltzer SM, Huq MS, Bryson L, Slowey T, Micka JA, DeWerd LA, Wells N, Hanson WF, Ibbott GS. The US radiation dosimetry standards for ^{60}Co therapy level beams, and the transfer to the AAPM accredited dosimetry calibration laboratories. Med Phys 33: 1074-7, 2006.

14. Ibbott G, Molineu A, Followill D. Independent evaluations of IMRT through the use of an anthropomorphic phantom. Technology in Cancer Research and Treatment 5:481-8, 2006.

15. Timmerman R, Galvin J, Michalski J, Straube W, Ibbott G, Martin E, Abdulrahman R, Swann S, Fowler J, Choy H. Accreditation and quality assurance for Radiation Therapy Oncology Group: Multicenter clinical trials using Stereotactic Body Radiation Therapy in lung cancer. Acta Oncologica 45:779-86, 2006.

16. Kry SF, Titt U, Ponisch F, Followill D, Vassiliev ON, White RA, Mohan R, Salehpour M. A monte carlo model for calculating out-of-field dose from a varian 6 MV beam. Med Phys 33:4405-4413, 2006.

17. Ibbott GS, Hanson WF, Martin E, Kuske RR, Arthur D, Rabinovitch R, White J, Wilenzick RM, Harris I, Tailor RC. Dose specification and quality assurance of RTOG protocol 95-17; a cooperative group study of 192Ir breast implants as sole therapy. Int J of Radiat Oncol Biol Phys, 2006 (in review).

18. Followill D, Radford DA, Cherry C, Molineu A, Fisher G, Hanson WF, Ibbott GS. Design, Development, and Implementation of the Radiological Physics Center's Pelvis and Thorax Anthropomorphic Quality Assurance Phantoms. Med Phys, 2006 (in review).

19. Li Z, Das RK, Dewerd LA, Ibbott GS, Meigooni AS, Perez-Calatayud J, Rivard MJ, Sloboda RS, Williamson JF. Dosimetric Prerequisites for Routine Clinical Use of Photon Emitting Brachytherapy Sources with Average Energy Higher than 50 Kev. Med Phys 34:37-40, 2007.

20. Mann AL, Kim JE, AAberg T, Blair NP, Dierner-West M, Followill D, Gilson MM, Olsen KR, Hawkins BS. Incidence of cataract and outcomes after cataract surgery in the first 5 years after ^{125}I brachytherapy in the COMS: COMS report No. 27. Ophthalmology 114:1363-71, 2007.

21. Kry SF, Followill D, White RA, Salehpour M. Uncertainty analysis for calculated risk of secondary fatal malignancies from radiotherapy including IMRT. Int J Radiat Oncol Biol Phys (accepted for publication) 2007.

22. Kry SF, Titt U, Followill D, Ponisch F, Vassiliev ON, White RA, Stovall M, Salehpour M. A monte carlo model for out-of-field dose calculation from high-energy radiation therapy. Med Phys (accepted for publication) 2007.

23. Ibbott GS, Followill DS, Molineu HA, Lowenstein JR, Alvarez PE, Roll JE. Challenges in credentialing institutions and participants in advanced technology multi-institutional clinical trials. International Journal of Radiation Oncology Biology Physics (accepted for publication) 2007.

24. Davidson, S, Ibbott G, Prado K, Dong L, Liao Z, Followill D. Accuracy of two heterogeneity dose calculation algorithms for IMRT in treatment plans designed using an anthropomorphic thorax phantom. Medical Physics 34:1850-57, 2007.

25. Followill D, Evans-Radford D, Cherry C, Molineu A, Fisher G, Hanson WF, Ibbott G. Design, Development, and Implementation of the Radiological Physics Center's Pelvis and Thorax Anthropomorphic Quality Assurance Phantoms. Medical Physics 34:2070-76, 2007.

26. Rivard MJ, Butler WM, DeWerd LA, Huq MS, Ibbott GS, Meigooni AS, Melhus CS, Mitch MG, Nath R, Williamson JF. Supplement to the 2004 update of the AAPM Task Group No. 43 Report. Medical Physics, 2007 (accepted for publication).

25. Ibbott GS, Hanson WF, Martin E, Kuske RR, Arthur D, Rabinovitch R, White J, Wilenzick RM, Harris I, Tailor RC. Dose specification and quality assurance of RTOG protocol 95-17; a cooperative group study of 192Ir breast implants as sole therapy. Int J of Radiat Oncol Biol Phys, 2007 (in press).

26. Ibbott GS, Followill DS, Molineu HA, Lowenstein JR, Alvarez PE, Roll JE. Challenges in credentialing institutions and participants in advanced technology multi-institutional clinical trials. Int J of Radiat Oncol Biol Phys, 2007 (in press).

27. Frey GD, Ibbott GS, Morin RL, Paliwal BR, Thomas SR, Bosma J. The American Board of Radiology perspective on maintenance of certification: Part IV: Practice quality improvement in radiologic physics. Medical Physics, 2007 (in press).

Abstracts

1. Kry S, Titt U, Poenisch F, Followill D, Vassiliev O, Mohan R, Salehpour M. A Monte Carlo Simulation of Out-Of-Field Radiation From An 18-MV Beam. *Medical Physics* 32: 1889, 2005.

2. Molineu A, Hernandez N, Alvarez P, Followill D, Ibbott G. IMRT Head and Neck Phantom Irradiations: Correlation of Results with Institution Size. *Medical Physics* 32:1983-4, 2005.

3. Davidson S, Followill D, Ibbott G, Prado K. The Evaluation of Several Commercial IMRT Treatment Planning Systems Heterogeneity Dose Calculation Algorithms Using An Anthropomorphic Thorax Phantom. *Medical Physics* 32:1988, 2005.

4. Homann K, Gates B, Salehpour M, Followill D, Kirsner S, Buchholz T, White R, Prado K. Evaluation of the Dose Within the Abutment Region Between Tangential and Supraclavicular Fields for Various Breast Irradiation Techniques. *Medical Physics* 32: 1995, 2005.

5. Lowenstein J, Roll J, Davis C, Holguin P, Duong H, Followill D, Ibbott G. Credentialing Requirements for NSABP B-39 / RTOG 0413. *Medical Physics* 32:2020-1, 2005.

6. Alvarez P, Molineu A, Hernandez N, Followill D, Ibbott G. Evaluation of Doses Delivered by SBRT to the Lung of An Anthropomorphic Thorax Phantom. *Medical Physics* 32: 2043, 2005.

7. Followill D, Molineu A, McGary J, Ibbott G. Clinical Reference Dosimetry of a "Hi-Art II" Helical Tomotherapy Machine. *Medical Physics* 32:2089, 2005.

8. Followill D, Lowenstein J, Jhingran A, Roll J, Hernandez N, Ibbott G. The Radiological Physics Center's Anthropomorphic Quality Assurance Phantom Family: New Developments. *Medical Physics* 32:2129, 2005.

9. Shoales J, Followill D, Ibbott G, Balter P, Tolani N. Development of An Independent Audit Device for Remote Verification of 4D Radiotherapy. *Medical Physics* 32:2128, 2005.

10. Followill D, Molineu A, McGary J, Hernandez N, Ibbott G. Evaluation of the TomoTherapy Planning Station Heterogeneity Correction Algorithm Using An Anthropomorphic Phantom. *Medical Physics* 32:2167, 2005.

11. Bencomo J, Macey D, Lawyer A. Verification of Dose Point Kernels for Ir-192 Brachytherapy. *Medical Physics* 32:1951, 2005.

12. Bencomo J, Weathers R, Stovall M, Ibbott G. Reference Electron Beam Dosimetry Data Set: A Preliminary Analysis. *Medical Physics* 32:1999, 2005.

13. Heard M, De La Mora A, Adamovics J, Ibbott G. Evaluation of a New 3D Polyurethane Dosimeter for IMRT Verification. *Medical Physics* 32:2167, 2005.

14. Vass H, Ibbott G. Comparison of PDR Iridium and LDR Cesium Through Monte Carlo Simulation. *Medical Physics* 32:1955, 2005.

15. Yoder R, Ibbott G. Needs in Ionizing Radiation Measurements and Standards. *Medical Physics* 32:2053, 2005.

16. Lowenstein J, Roll J, Ibbott G. Common Dosimetry Errors in Cervix Patients Treated with Brachytherapy on Clinical Trials. *Medical Physics* 32:2107, 2005.

17. Ibbott G. The Radiological Physics Center's QA Activities. *Medical Physics* 32:2153-4, 2005.

18. Briere TM, Tailor RC, Tolani NB, Prado KL, Lane RG, Woo SY, Ha CS, Gillin MT, Beddar AS. In Vivo Dosimetry Using Disposable MOSFET Dosimeters for Total Body Irradiation. *Medical Physics* 32:1996, 2005.

19. Schild SE, McGinnis WL, Graham D, Hillman S, Ibbott G, Northfelt D, Garces Y, Yee G, Bollinger J, Jett J. Results of a Phase I Trial of Concurrent Chemotherapy and Escalating Doses of Radiation for Unresectable Non-Small Cell Lung Cancer. *International Journal of Radiation Oncology Biology Physics* 63:S44, 2005.

20. Molineu A, Alvarez P, Hernandez N, Followill DS, Ibbott GS. Analysis of Errors Made During 138 IMRT Irradiations of an Anthropomorphic Phantom. *International Journal of Radiation Oncology Biology Physics* 63:S58, 2005.

21. Simon W, Kozelka J, Rose M, Liu C, Palta J, Dempsey J, Lynch B, Bayouth J, Pavord D, Ibbott G, Followill D.

LINAC dosimetry: benchmark data set uncertainty. Med Physics 33:2118, 2006.

22. Kry S, Followill D, White R, Salehpour M. Uncertainty analysis of risk of secondary fatal malignancies from radiotherapy treatments including IMRT. Med Physics 33:2257, 2006.

23. Simon W, Kozelka J, Rose M, Liu C, Palta J, Dempsey J, Lynch B, Bayouth J, Pavord D, Ibbott G, Tailor R, Followill D. LINAC dosimetry: benchmark data set requirements. Med Physics 33:2118, 2006.

24. Lowenstein J, Davis C, Roll J, Harris I, Hall F, Followill D, Ibbott G. The credentialing process for the NSABP B-39/RTOG 0413 partial breast irradiation trial. Med Physics 33:2140, 2006.

25. Alvarez P, Hernandez N, Followill D, Tailor R, Ibbott G. Characterization of EBT versus MD55 gafchromic® films for relative dosimetry measurements. Med Physics 33:2217-18, 2006.

26. Hecox R, Gibbons J, Followill D, Ibbott G. Dose calculation accuracy in the presence of high-z materials using megavoltage CT for treatment planning. Med Physics 33:2087-8, 2006.

27. Howell R, Kry S, Followill D, Hertel N, Wang Z, Salehpour M. Investigation of MLC effects on secondary neutron spectra for Varian, Siemens, and Elekta. Med Physics 33: 2249-50, 2006.

28. Alvarez P, Molineu A, Hernandez N, Followill D, Ibbott G. Evaluation of heterogeneity corrections algorithms through the irradiation of a lung phantom. Med Physics 33:2214, 2006.

29. Followill D, Molineu A, Alvarez P, Ibbott G. The state of radiotherapy physics through the eyes of a quality auditor. Med Physics 33:2283, 2006.

30. Davidson S, Prado K, Ibbott G, Followill D. Hetergeneity dose calculation accuracy in IMRT using an anthropomorphic thorax phantom. Med Physics 33:2106, 2006.

31. Followill D, Kry S, Salehpour M. Measurements of secondary radiation for electron and proton accelerators. Med Physics 33:2238-9, 2006.

Invited Articles

1. Ibbott GS. The medical physics consult - gel dosimetry. J of the Amer College of Radiol 3:144-6, 2006.

Letters to the Editor/Newsletters

1. Nag S, Cardenas H, Chang S, Das IJ, Ibbott GS, Thomadsen B, Varia M. Reply to GEC-ESTRO-GYN letter. *Int. J. of Radiation Oncology, Biol. Phys.* 62:295-6, 2005.

2. Nag S, Cardenas H, Chang S, Das IJ, Ibbott GS, Lowenstein J, Roll J, Thomadsen B, Varia M. Reply to Narayan et al regarding ROB-D-05-00575. *Int. J. of Radiation Oncology, Biol. Phys.* (in press), 2005.

3. Butler WM, Huq MS, Li Z, Thomadsen BR, DeWerd LA, Ibbott GS, Mitch MG, Nath R, Rivard MJ, Williamson JF, Yue NJ, Zaider M. Third party brachytherapy seed calibrations and physicist responsibilities. *Medical Physics* 33:247-8, 2006.

Book Chapters

1. Galvin JM, Ibbott GS. Commissioning and accreditation of a stereotactic body radiation therapy program. In: Stereotactic Body Radiation Therapy, Lippincott Williams & Wilkins, Philadelphia, pp. 85-93, 2005.

2. Ibbott GS. Radiation dosimetry: 3-dimensional. In: Webster JC, Encyclopedia of Medical Devices and Instrumentation, John Wiley & Sons, Hoboken, pp. 481-500, 2006.

PRESENTATIONS
INTERNATIONAL ACTIVITIES

Geoffrey Ibbott presented at the ABR/CAMPEP Summit, Dallas, TX, August 17-19, 2007.

Geoffrey Ibbott hosted the IEC US TAG Meeting, Washington, DC, October 16, 2007.

Francisco Aguirre attended the IV Latin American Congress, Cartagena, Columbia, October 7-10, 2007.

VISITS TO INSTITUTIONS

1. Scott Davidson performed a research visit at the Washington University, St. Louis, MO, July 5-11, 2007.

2. Francisco Aguirre performed radiological physics measurements and reviewed patient dosimetry at the Montefiore Medical Center, New York, NY, July 8-14, 2007.

3. Paola Alvarez performed radiological physics measurements and reviewed patient dosimetry at the AOS Scottsdale Center, Phoeniz, AZ, August 20-22, 2007.

4. Paola Alvarez performed radiological physics measurements and reviewed patient dosimetry at the Cobb Center for Radiation Therapy, Atlanta GA, September 10-12, 2007.

5. Scott Davidson performed a research visit at Regions Hospital, St. Paul, MN, September 14-20, 2007.

6. David Followill performed radiological physics measurements and reviewed patient dosimetry at the Tacoma Valley ROC, Tacoma, WA, September 17-19, 2007.

7. Jessica Lowenstein performed radiological physics measurements and reviewed patient dosimetry at the Tacoma Valley ROC, Tacoma, WA, September 17-19, 2007.

8. Andrea Molineu performed radiological physics measurements and reviewed patient dosimetry at the Hulston Cancer Center, Springfield, MO, October 8-11, 2007.

MEETINGS ATTENDED
(July 1, 2007 - October 31, 2007)

1. Joye Roll attended the GOG Meeting, Philadelphia, PA, July 18-21, 2007.

2. Jessica Lowenstein attended the GOG Meeting, Philadelphia, PA, July 18-21, 2007.

3. Francisco Aguirre attended the AAPM Annual Meeting, Minneapolis, MN, July 21-25, 2007.

4. Paola Alvarez attended the AAPM Annual Meeting, Minneapolis, MN, July 21-24, 2007.

5. Jose Bencomo attended the AAPM Annual Meeting, Minneapolis, MN, July 20-26, 2007.

6. Whitney Bivens attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.

7. Scott Davidson attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.

8. David Followill attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.

9. Irene Harris attended the AAPM Annual Meeting, Minneapolis, MN, July 21-25, 2007.

10. Malcolm Heard attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.

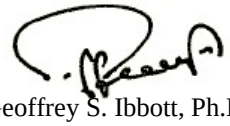
11. Nadia Hernandez attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.

12. Geoffrey Ibbott attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.

13. Susannah Lazar attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.

14. Jessica Lowenstein attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.
15. Andrea Molineu attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.
16. Paige Nitsch attended the AAPM Annual Meeting, Minneapolis, MN, July 21-26, 2007.
17. David Followill attended the ATC-QARC Meeting, Providence, RI, July 31-August 1, 2007.
18. Geoffrey Ibbott attended the ATC-QARC Meeting, Providence, RI, July 31-August 1, 2007.
19. Geoffrey Ibbott attended the NCI Group Chairs Meeting, Washington, DC, September 17-18, 2007.
20. Irene Harris attended the NCCTG Meeting Minneapolis, MN, September 26-28, 2007.
21. Geoffrey Ibbott attended the NCCTG Meeting Minneapolis, MN, September 26-28, 2007.
22. Geoffrey Ibbott attended the Imaging Network ACRIN Fall Meeting, Arlington, VA, September 27-29, 2007.
23. Jessica Lowenstein attended the RTOG Meeting, Philadelphia, PA, October 4, 2007.
24. Francisco Aguirre attended the SWOG Meeting, Huntington Beach, CA, October 4-6, 2007.
25. David Followill attended the COG Meeting, Denver, CO, October 17-19, 2007.
26. Jaclyn Homnick attended the SWAAPM Meeting, Irving, TX, October 18-19, 2007.
27. Andrea Molineu attended the SWAAPM Meeting, Irving, TX, October 18-19, 2007.
28. Geoffrey Ibbott attended the SWAAPM Meeting, Irving, TX, October 18-19, 2007.
29. Geoffrey Ibbott attended the SWAAPM Meeting, Irving, TX, October 18-20, 2007.
30. Jaclyn Homnick attended the CIRMS Meeting, Washington, DC, October 20-22, 2007.
31. Geoffrey Ibbott attended the CIRMS Meeting, Washington, DC, October 21-24, 2007.
32. Francisco Aguirre attended the ASTRO Meeting, Los Angeles, CA, October 27-31, 2007.
33. Cindy Davis attended the ASTRO Meeting, Los Angeles, CA, October 27-31, 2007.
34. David Followill attended the ASTRO Meeting, Los Angeles, CA, October 27-30, 2007.
35. Franklin Hall attended the ASTRO Meeting, Los Angeles, CA, October 27-31, 2007.
36. Geoffrey Ibbott attended the ASTRO Meeting, Los Angeles, CA, October 27-November 1, 2007.
37. Andrea Molineu attended the ASTRO Meeting, Los Angeles, CA, October 27-31, 2007.
38. Joye Roll attended the ASTRO Meeting, Los Angeles, CA, October 27-31, 2007.

Respectfully submitted,



Geoffrey S. Ibbott, Ph.D.

EXPENDITURES OF THE RADIOLOGICAL PHYSICS CENTER
(RPC Grant and the Advanced Technology Subcontract)
July 1, 2007 - October 31, 2007

PERSONNEL (salaries, fringe benefits): $757,019

7 Physicists, 1 Supervisor of Quality Assurance Dosimetry Services, 1 Sr. QA Dosimetrist, 3 QA Dosimetrists, 1 Informatics Manager, 1 Database Administrator, 1 Programmer Analyst I, 1 Radiological Physics Supervisor, 6 Radiological Physics Technicians, 1 Coordinator of Research Data, 1 Department Administrator, 1 Office Manager, 1 Sr. Administrative Assistant, 1 Administrative Assistant, 1 Sr. Secretary, and 3 Graduate Research Assistants.

TRAVEL
Visits:

Davidson, Scott	Research visit – Washington University, St. Louis, MO	$	576.37
Aguirre, Francisco	Montefiore Medical Center, New York, NY	$	2,443.98
Alvarez, Paola	AOS Scottsdale, Phoenix, AZ	$	733.95
Alvarez, Paola	Cobb Center for Radiation Therapy, Atlanta, GA	$	697.99
Davidson, Scott	Research – Regions Hospital St. Paul, Minneapolis, MN	$	1,701.89
Followill, David	Tacoma Valley ROC, Tacoma, WA	$	1,525.12
Lowenstein, Jessica	Tacoma ROC – St. Joseph, Tacoma, WA	$	1,362.45
Molineu, Andrea	Hulston Cancer Center, Springfield, MO	$	1,000.89
	Sub-Total	$	**10,042.64**

Meetings:

Aguirre, Francisco	AAPM Annual Meeting, Minneapolis, MN	$	1,154.00
Aguirre, Francisco	SWOG meeting, Huntington Beach, CA	$	601.83
Aguirre, Francisco	ASTRO meeting, Los Angeles, CA	$	1,360.85
Alvarez, Paola	AAPM Annual meeting, Minneapolis, MN	$	1,111.54
Bencomo, Jose	AAPM Annual meeting, Minneapolis, MN	$	3,105.15
Bivens, Whitney	AAPM Annual meeting, Mineapolis, MN	$	1,080.59
Davidson, Scott	AAPM Annual meeting, Minneapolis, MN	$	1,227.58
Davis, Cindy	ASTRO meeting, Los Angeles, CA	$	1,777.55
Followill, David	AAPM Annual meeting, Minneapolis, MN	$	2,701.03
Followill, David	ATC – QARC meeting, Providence, RI	$	978.92
Followill, David	COG meeting, Denver, CO	$	1,001.80
Followill, David	ASTRO meeting, Los Angeles, CA	$	2,406.18
Hall, Franklin	ASTRO meeting, Los Angeles, CA	$	2,047.48
Harris, Irene	AAPM Annual meeting, Minneapolis, MN	$	1,552.54
Harris, Irene	NCCTG meeting, Minneapolis, MN	$	1,198.01
Heard, Malcolm	AAPM Annual meeting, Minneapolis, MN	$	1,252.96
Hernandez, Nadia	AAPM Annual meeting, Minneapolis, MN	$	1,579.67
Homnick, Jacklyn	SW-AAPM conference, Irving, TX	$	1,059.00
Homnick, Jacklyn	CIRMS meeting, Gaithersburg, MD	$	1,657.87
Ibbott, Geoffrey	AAPM Annual meeting, Minneapolis, MN	$	2,384.30
Ibbott, Geoffrey	ATC – QARC meeting, Providence, RI	$	945.04
Ibbott, Geoffrey	NCI Group Chairs meeting, Washington, DC	$	850.59
Ibbott, Geoffrey	NCCTG meeting, Minneapolis, MN	$	1,232.53
Ibbott, Geoffrey	Imaging Network ACRIN Fall meeting, Arlington, VA	$	1,426.77
Ibbott, Geoffrey	SW-AAPM conference, Irving, TX	$	1,010.88
Ibbott, Geoffrey	CIRMS meeting, Washington, DC	$	1,420.89
Ibbott, Geoffrey	ASTRO meeting, Los Angeles, CA	$	1,626.56
Lazar, Sussanah	AAPM Annual meeting, Minneapolis, MN	$	903.46
Lowenstein, Jessica	GOG meeting, Philadelphia, PA	$	1,344.12
Lowenstein, Jessica	AAPM Annual meeting, Minneapolis, MN	$	916.42

Molineu, Andrea	AAPM Annual meeting, Minneapolis, MN	$ 1,549.37
Molineu, Andrea	SW-AAPM conference, Irving, TX	$ 467.26
Molineu, Andrea	ASTRO meeting, Los Angeles, CA	$ 2,094.22
Nitsch, Paige	AAPM Annual meeting, Minneapolis, MN	$ 1,063.54
Roll, Joye	GOG meeting, Philadelphia, PA	$ 1,030.12
Roll, Joye	ASTRO meeting, Los Angeles, CA	$ 2,275.47
Wells, Nathan	AAPM Annual meeting, Minneapolis, MN	$ 1,471.45
	Sub-Total	**$ 52,867.54**
	TOTAL AMOUNTS	**$ 62,910.18**

CONSULTANTS	**$ -0-**
SUPPLIES:	**$ 34,397.00**
Office supplies, laboratory and record keeping, TLD, TLD supplies, software, equipment, etc.	
OTHER EXPENSE:	**$ 32,771.00**
Postage, telephone, reprints, copying, computer fees, equipment repair, registration fees, tuition, freight/delivery, etc.	
SPACE RENTAL:	**$ 80,428.00**
Total Expenditures July 1, 2007 - October 31, 2007	**$ 967,525.18**
Indirect costs @ 26%	**$ 251,556.55**
TOTAL	**$1,219,081.73**

RPC Report to TPC October 2007

Clinical Study Groups	Office Reviewing Patient Records	Special Projects
Gynecologic Oncology Group GOG	**RPC**	**Radiotherapy manual** **Electronic Transfer of Patient Records** **Image Based Treatment Planning** **IMRT Guidelines** **Defining Treatment violations**
National Surgical Adjuvant Breast and Bowel Project NSABP	**RPC**	**IMRT Guidelines** **Partial Breast RT Credentialing**
North Central Cancer Treatment Group NCCTG	**RPC**	**Rapid Review of Lung Study** **3D CRT credentialing** **Stereotactic Phantom**
Radiation Therapy Oncology Group RTOG	**RTOG/RPC**	**IMRT H&N Phantom** **Prostate Phantom** **Prostate Implant Credentialing LDR/HDR** **Stereotactic Head Phantom** **Lung Phantom** **4D Liver Phantom** **Cervix HDR/LDR protocol compliance** **Patient Calculation Program** **Partial Breast RT Credentialing** **IMRT Benchmark Case**
Southwest Oncology Group SWOG	**QARC**	**3D Benchmark Case**
Clinical Trial Support Unit CTSU	**QARC, RPC, RTOG**	**RPC Institution List** **RTF Numbers** **TLD Monitoring** **Review RT Facility Questionnaire**
American College of Radiology Imaging Network ACRIN	**N/A**	**Participate in the development of guidelines for quality assurance of institution participating in ACRIN** **CT Dose Measurements**
American College of Surgeons Oncology Group ACOSOG	**QARC**	**RPC Institution List**
Cancer and Acute Leukemia Group B CALGB	**QARC**	**TRUS Prostate Approval Collaboration**
Children's Oncology Group COG	**QARC**	**3D Benchmark Case** **IMRT Benchmark Case/Phantom** **CT/MRI Fusion Benchmark**
Eastern Cooperative Oncology Group ECOG	**QARC**	